CHAPTER 7. COMPARISON OF PRELIMINARY ALTERNATIVES

While all preliminary alternatives meet the identified planning objectives completely, and satisfy the planning criteria and constraints effectively, the efficiency and acceptability of these preliminary alternatives varies. SRWRS development can be more focused if the preliminary alternatives are modified, combined, or removed based on findings from initial analyses and public input received during the scoping process.

This chapter describes the results of initial analyses comparing preliminary alternatives and the comments received on the preliminary alternatives during public scoping, and recommends alternatives for further study.

INITIAL ANALYSES OF PRELIMINARY ALTERNATIVES

Initial analyses of institutional requirements, engineering considerations, and environmental considerations were conducted to further assess the feasibility of the preliminary alternatives.

- **Institutional Requirements**. Analysis was conducted as part of the measure screening in **Chapter 6**, including considerations of the need for modifications to existing water rights and contract entitlements, and/or additional operational agreements with entities other than Reclamation and cost-sharing partners. Findings are summarized in **Table 7-1**.

- **Engineering Considerations.** Analysis included engineering definitions of the extent and description of the key elements, potential challenges, and a preliminary cost estimation (opinion of cost) for each preliminary alternative. Details are discussed in the **2004 SRWRS Phase 1 Engineering Report** (included in **Appendix C**) and summarized in **Table 7-2**.

  Note that the initial engineering evaluation suggests that the Elverta location is superior to the Elkhorn location for an M&I diversion because it is located in a deeper channel section, which could facilitate a pier-type diversion with screens on both sides to increase operational efficiency. Therefore, the summary of results in this chapter for the Elkhorn/Elverta diversion alternative was based on diverting from the Elverta location.

- **Environmental Considerations.** Analysis included consideration of the anticipated magnitudes of effect on the environment, and consequent mitigation requirements, and recommended modifications to the preliminary alternatives based on known environmental conditions to reduce potential impacts. Details are discussed in the **SRWRS Phase 1 Environmental Evaluation** (included in **Appendix D**), and summarized in **Table 7-3**.

Table 7-1. Summary of Initial Analyses: Institutional Considerations

Major Institutional Considerations and Requirements	Relative Level of Difficulty by Preliminary Alternative				
	Elkhorn/Elverta Diversion Alternative	Sankey Diversion Alternative	Feather River Diversion Alternative	ARPS Alternative	Folsom Dam Alternative
Reclamation Decisions	**Medium**	**Medium**	**High**	**Low**	**Low**
▪ Approval for adding a Sacramento River location for PCWA's CVP delivery	Yes	Yes	-	-	-
▪ Approval for exchanging MFP water on the American River and CVP delivery on the Sacramento River for diversions by SSWD and Roseville	Yes	Yes	-	-	-
▪ Modifications to the COA through coordination with the SWP for PCWA's CVP delivery, and exchanged deliveries to SSWD and Roseville	-	-	Yes	-	-
SWRCB Decisions	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**
▪ Approval for Sacramento to add the diversion location to its water rights permits	Yes	Yes	Yes	Yes	Yes
▪ Modifications to MFP water rights to allow non-wet year diversions for SSWD from Folsom Dam	-	-	-	Yes	Yes
Major Additional Local Agreements/Coordination	**Medium**	**Medium**	**Medium**	**Medium/High**	**High**
▪ Agreements with the Water Forum Successor Effort on changes in diversions from the American River for PCWA and SSWD	-	-	-	Yes	Yes
▪ Additional agreements with SJWD to use a portion of its WTP firm capacity and conveyance facilities for PCWA's diversion	-	-	-	-	Yes
▪ ABFSHIP	Yes	Yes	Yes	Yes	Yes
▪ Sutter County	Yes	Yes	Yes	-	-
▪ Reclamation District 1000	Yes	Yes	Yes	Yes	Yes
▪ Folsom dam raise	-	-	-	-	Yes
▪ Secondary M&I outlet at Folsom Dam for Roseville, SJWD, and City of Folsom	-	-	-	-	Yes

Table 7-2. Summary of Initial Analyses: Engineering Considerations

Major Engineering Considerations	Relative Level of Difficulty by Preliminary Alternative				
	Elkhorn/Elverta Diversion Alternative	Sankey Diversion Alternative	Feather River Diversion Alternative	ARPS Alternative	Folsom Dam Alternative
Engineering Issues	**Medium**	**Medium/high**	**High**	**Low**	**High**
▪ Shallow river depth could limit diversion design	-	-	Yes	-	-
▪ Existing facilities could limit diversion design	-	-	-	-	Yes[1]
▪ Existing facilities could incorporate potential capacity expansion in their original design	-	-	-	Yes[1]	-
▪ Potentially high public disturbance in urban area	-	-	-	-	Yes[2]
▪ Challenging roadway and river crossing	Yes	Yes	Yes	Yes	Yes
▪ Challenging levee crossing	Yes	Yes	Yes	Yes[2]	Yes[2]
▪ Levee setback requirements	-	Yes[3]	-	-	-
▪ Modifications to Folsom Dam facilities	-	-	-	-	Yes[1]
▪ Hilly and rocky terrain	-	-	-	Yes	-
▪ Potentially unfavorable soil at facility sites	Yes	Yes	Yes	Yes[2]	Yes[2]
▪ High water table at construction sites	Yes	Yes	Yes	Yes[2]	Yes[2]
▪ More permit requirements for multiple intakes	-	Yes	Yes	Yes	Yes
Engineering Cost	**Medium**	**Medium**	**High**	**Low**	**Medium/High**
▪ Preliminary estimate of construction cost (without costs of real estate and environmental mitigation)	$495,700,000	$545,700,000	$561,100,000	$433,500,000	$460,900,000 (penstock option; cost increases with other options)
▪ Cost per AF of surface water diversion; based on the above opinion of cost, and assumed 50 years of project life, and rounded to nearest $5 increment	$90	$100	$105	$85	$90 (penstock option; cost increases with other options)

[1] PCWA only
[2] Sacramento only
[3] PCWA, SSWD, and Roseville only

Table 7-3. Summary of Initial Analyses: Environmental Considerations

Major Environmental Considerations	Potential Level of Magnitude of Effect by Preliminary Alternative				
	Elkhorn/Elverta Diversion Alternative	Sankey Diversion Alternative	Feather River Diversion Alternative	ARPS Alternative	Folsom Dam Alternative
Botany and Wildlife	**Low**	**High**	**High/Infeasible**	**Medium/High**	**Medium**
▪ Riparian woodland habitat at intake location	Yes	Yes	Yes	Yes[2]	Yes[2]
▪ Good quality of riparian wetland at intake location	-	-	Yes	-	-
▪ Wetland and vernal pools near WTP facility sites	Yes	Yes	Yes	-	-
▪ Vernal pools near treated water pipelines	Yes	Yes	Yes	Yes	Yes
▪ Affecting similar physical environment at multiple diversion locations	-	Yes	Yes	-	-
▪ Proximity to major wildlife area and preserve with greater potential of terrestrial resource impacts	-	-	Yes[3]	-	-
Fishery and Water Quality	**Medium**	**Medium**	**Medium**	**High**	**High**
▪ High quality of shaded area riverine habitat at diversion locations	-	-	Yes[3]	-	-
▪ Diversion from a migration corridor for anadromous fish	Yes	Yes	Yes	Yes[2]	Yes[2]
▪ Diversion from the American River with higher fishery sensitivity	-	-	-	Yes[4]	Yes[4]
▪ Potential reduction in downstream dilution potential and increased surface water quality parameters of concern	Yes	Yes	Yes	Yes	Yes
Recreation	**Low**	**Medium**	**Low**	**Medium**	**Low**
▪ Protrusion of diversion structure may reduce river recreation experience	Yes	Yes	Yes	-	Yes[2]
▪ Near Feather River Wildlife Area and Bobelaine Ecological Reserve	-	-	Yes	-	-
▪ Within Folsom Lake SRA	-	-	-	-	Yes[1]
▪ Within Auburn SRA	-	-	-	Yes[2]	-
▪ Previous concerns expressed about the facility currently under construction and expansion related to alternatives under consideration				Yes[2]	

Table 7-3. Summary of Initial Analyses: Environmental Considerations (cont'd)

Major Environmental Considerations	Potential Level of Magnitude* of Effect by Preliminary Alternative				
	Elkhorn/Elverta Diversion Alternative	Sankey Diversion Alternative	Feather River Diversion Alternative	ARPS Alternative	Folsom Dam Alternative
Land Use	**Low**	**Low**	**Low**	**Low**	**Low**
▪ Potential conflict between WTP and proposed airport expansion	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]
▪ Potential conflict between WTP and nearby residential uses	-	Yes[3]	-	-	-
▪ New pipelines go through established residential areas that may be subjected to significant disruption during construction	-	-	-	-	Yes[1]

* Level of Magnitude:
High/Infeasible = Significant impacts would be infeasible to mitigate
High = Mostly significant effects in one or more resource areas, with significant need for mitigation
Medium = Mostly significant with some less than significant
Low = Mostly less than significant

[1] PCWA only
[2] Sacramento only
[3] PCWA, SSWD, and Roseville only
[4] PCWA and SSWD only

PUBLIC INPUT ON PRELIMINARY ALTERNATIVES AND STUDY DEVELOPMENT

Preliminary alternatives were included in the NOI and NOP issued for the SRWRS scoping process in July and August 2003, respectively. The alternatives were presented in briefings from July through October 2003, and scoping meetings in September 2003 were held to solicit public input on preliminary alternatives and study development.

SRWRS Scoping Report

The scoping process for the SRWRS took place from July through October 2003. Six public scoping meetings and eighteen briefings were conducted in addition to communication through written materials such as an NOI/NOP and Prescoping Discussion.

The Scoping Report documents the scoping process, questions and comments received during the scoping process, and the SRWRS approach to major categories of scoping questions and comments. The report has the following attachments:

- NOI/NOP
- Prescoping Discussion
- Supplemental information from briefings and public scoping meetings

The NOI/NOP and public input received during the scoping process are documented in a **Scoping Report**[21] (included in **Appendix E**). The majority of the scoping comments and questions fit into one of five categories: (1) EIS/EIR issues, (2) compliance with the authorizing legislation, (3) definition of alternatives, (4) coordination with other projects/studies, and (5) water conservation. These comments and questions will be taken into consideration as the SRWRS continues.

Comments related to the feasibility of the preliminary alternatives were consistent with findings in the above-mentioned initial analyses performed for the preliminary alternatives. The public also recommended that the SRWRS coordinate with other ongoing projects/studies through various outreach activities; specifically, the SRWRS shall coordinate with the ABFSHIP, CVP long-term contract renewal, and CVP OCAP consultation. This level of coordination also has been considered critical in the development of SRWRS.

- **Coordination with ABFSHIP**. Coordination between ABFSHIP and the SRWRS is necessary for many reasons:

  - These two projects are included in the WFA and have the same study authorization; Reclamation is the lead agency for both for NEPA compliance.

  - The development schedule for the SRWRS is similar to that for ABFSHIP, despite a 3-year lapse between their corresponding start dates.

  - These two projects include major diversions within a 2-mile reach of the Sacramento River near the Sacramento International Airport.

  - A portion of the Natomas Basin is experiencing a change in land use from agriculture to urbanization. A regional approach for facility development and water management could preserve more flexibility to accommodate future changes in land use plans.

  Potential regional benefits in water management and environmental preservation motivate coordination between ABFSHIP and the SRWRS; this coordination may influence the facility plans under each scenario, as discussed later in this chapter.

- **Coordination with CVP Long-Term Contract Renewal.** Regarding the SRWRS, Long-Term Contract Renewal would provide authority for CVP diversions at Folsom Dam for PCWA and Roseville. CVP contract entitlements are a critical part of PCWA's and Roseville's future water supply plan. With assistance from the cost-sharing partners, water supply conditions developed for the SRWRS can be used to refine Reclamation's needs assessment, which was conducted as part of

[21] SRWRS. 2004. SRWRS Scoping Report.

the contract renewal efforts. Conversely, the renewal efforts will help establish a basis of comparison for environmental review for the SRWRS.

- **Coordination with CVP OCAP Consultation.** The OCAP and associated CVP-SWP joint operation considered in the consultation process covers a complete set of current and future operations and regulatory requirements for the CVP and SWP system, and other local projects and water rights diversions. The recently completed OCAP consultation has resulted in formalized operation and a new environmental baseline for ESA compliance, which would be used for the SRWRS. Similar to coordination with CVP Long-Term Contract Renewal, detailed water need assessments for the cost-sharing partners developed for the SRWRS can provide refined information for the future revision of OCAP and associated consultation needs.

SCREENING OF PRELIMINARY ALTERNATIVES

The five preliminary action alternatives were screened based on public input and results from the aforementioned initial analyses. The purpose of the screening was to provide additional focus in continued SRWRS development by removing/adding/combining alternatives and project components.

Overall Assessment of Preliminary Alternatives

The Feather River Diversion Alternative is the only preliminary alternative on this river. It compared unfavorably with other alternatives in all aspects considered in initial analyses. First, it is likely to create significant environmental impacts on botanic and wildlife resources that may not be feasible to mitigate. Also, a significant involvement by the SWP would be required to facilitate planned diversions, resulting in additional institutional difficulties. Lastly, unfavorable engineering conditions at the diversion location would render a less efficient and sediment-prone design.

On the Sacramento River, the Sankey Diversion Alternative has no advantages compared with the Elverta Diversion Alternative due to its higher cost, greater environmental impacts due to two water supply systems, and required coordination with ABFSHIP for two diversions instead of one. In addition, having major water supply facilities in Sutter County is a disadvantage for PCWA, Roseville, and SSWD because their service areas are within Placer and Sacramento counties.

On the American River, comparison of the ARPS and Folsom Dam alternatives has mixed results. Institutional requirements for these two alternatives are similar. The ARPS alternative appears to be the least-cost alternative, but it may have a high level of effect on the environment compared with the Folsom Dam Alternative. The Folsom Dam Alternative would be the most difficult to construct. In addition, the Folsom Dam Alternative could require significant coordination with major structural modifications/improvements of Folsom Dam that are either scheduled for implementation or currently under study, which would be a significant disadvantage considering the planning objective of completing the SRWRS selected plan by 2010.

Therefore, after considering all factors, the following preliminary alternatives were removed from further study:

- Feather River Diversion Alternative
- Sankey Diversion Alternative
- Folsom Dam Alternative

Recommended Alternatives for Further Study

Two preliminary action alternatives were retained for further study: the Elkhorn/Elverta Diversion Alternative and ARPS Alternative. These two preliminary action alternatives were further developed into four action alternatives to incorporate considerations for coordination with ABFSHIP on its Sankey/Elkhorn Diversions Alternative for further study development and environmental review. These four retained alternatives are described below (the corresponding facility plans are summarized in **Table 7-4**):

- **SRWRS Elverta Diversion Alternative** (see **Figure 7-1**). This alternative consists of the Elverta Diversion and associated facility plan to accommodate only the needs of the SRWRS cost-sharing partners. The infrastructure plan includes a raw water intake and pump station located on the Sacramento River with a total discharge capacity of 235 mgd, or 365 cfs, a new joint WTP of the same capacity along Elverta Road, raw water pipelines, and treated water pipelines to the connecting point(s) of each cost-sharing partner's existing water distribution system. It is anticipated that the intake and WTP would be owned and operated by Sacramento. Under this alternative, it is assumed that NMWC would construct and operate its Elkhorn Diversion of 136 mgd (210 cfs), planned for ABFSHIP independent of the SRWRS, or continue to divert from their existing diversions.

- **Joint SRWRS-ABFSHIP Elverta Diversion Alternative** (see **Figure 7-2**). This alternative consists of a consolidated diversion on the Sacramento River and associated facility plan to accommodate the needs of the SRWRS cost-sharing partners, and the needs of NMWC from its planned Elkhorn Diversion under ABFSHIP. In other words, in addition to facilities of the SRWRS Elverta Diversion Alternative, this alternative includes an additional diversion capacity of 165 mgd (210 cfs) and landside improvements for accommodating NMWC's needs from the planned Elkhorn Diversion, if the ABFSHIP lead agencies recommend the proposed Sankey/Elkhorn Diversions alternative in their final decision(s). Therefore, the Elkhorn Diversion planned in ABFSHIP would not be constructed.

  No implication about NMWC's existing water rights and contract entitlements was made by proposing a consolidated diversion for the Joint SRWRS-ABFSHIP Elverta Diversion Alternative and this alternative is subject to agreement among local water purveyors. ABFSHIP would be maintained in a separate study pursued by NMWC to consolidate its existing five agricultural diversions into two for fishery protection and operational efficiency. The SRWRS would consider only facility components and their associated environmental impacts that are necessary to move the planned Elkhorn Diversion to the Elverta location for potential regional benefits.

- **ARPS-Elverta Diversion Alternative** (see **Figure 7-3**). Under this alternative, PCWA would expand its ARPS near Auburn from a capacity of 100 cfs to 200 cfs; expand its Foothill Phase II WTP with an increment of like capacity; and expand its associated transmission facilities. SSWD would divert from SJWD's existing diversion facilities at Folsom Dam using shoulder capacity. Roseville would increase use of groundwater to satisfy its needs under this alternative, but would have no additional surface water diversions. Sacramento would divert separately from the Sacramento River at the Elverta site through a new intake of 145 mgd (235 cfs), and construct its own treatment and transmission facilities to serve its needs. Under this alternative, NMWC would construct and operate its planned Elkhorn Diversion of 136 mgd (210 cfs) independent of the SRWRS, or continue to divert from their existing diversions.

- **ARPS-Joint Sacramento-ABFSHIP Elverta Diversion Alternative** (see **Figure 7-4**). This alternative would have the same facilities as for the ARPS-Elverta Diversion Alternative, an additional diversion capacity of 165 mgd (210 cfs), and landside improvements for accommodating NMWC's needs from the planned Elkhorn Diversion, if the ABFSHIP lead agencies recommend the proposed Sankey/Elkhorn Diversions alternative in their final decision(s).

  Similar to the Joint SRWRS-ABFSHIP Elverta Diversion Alternative, no implication about NMWC's existing water rights and contract entitlements was made by proposing a consolidated diversion for

Sacramento and ABFSHIP and this alternative is subject to agreement among local water purveyors. ABFSHIP would be maintained in a separate study pursued by NMWC to consolidate its existing five agricultural diversions into two for fishery protection and operational efficiency. The SRWRS would consider only facility components and their associated environmental impacts that are necessary to move the planned Elkhorn Diversion to the Elverta location for potential regional benefits.

Note that the development of ABFSHIP is independent to SRWRS development. The final Federal decision(s) on ABFSHIP has not been made. The above description of retained alternatives with a consolidated diversion (Joint SRWRS-ABFSHIP Elverta Diversion Alternative and ARPS-Joint Sacramento-AFSHIP Elverta Diversion Alternative) assumes the condition of the ABFSHIP-proposed action under its ASIP process, which would allow the opportunity for a consolidated diversion. If the final Federal decision(s) on ABFSHIP indicates otherwise, these alternatives would be reduced to their corresponding counterpart without the consolidation feature (i.e., SRWRS Elverta Diversion Alternative and ARPS-Elverta Diversion Alternative, respectively).

Table 7-4. Summary of Facility Plans for Alternatives Retained for Further Study

Alternative	Purveyor	SRWRS Facility Plan for Diversions Under Consideration[1]						Corresponding ABFSHIP Elkhorn Diversion Capacity (listed for reference only)	
		Diversion			Treatment Capacity (mgd)	Transmission Pipelines	Canal Improvement		
		Location	Capacity Increment (cfs)	Capacity Increment (mgd)				(cfs)	(mgd)
SRWRS Elverta Diversion Alternative	PCWA	Elverta	101	65	65	Connecting to distribution systems	Relocation near diversion		
	SSWD	Elverta	23	15[2]	15[2]				
	Roseville	Elverta	16	10	10				
	Sacramento	Elverta	225	145	145				
	NMWC	-	-	-	-	-	-	210	136
	Subtotal for Elverta		**365**	**235**	**235**				
Joint SRWRS-ABFSHIP Elverta Diversion Alternative	PCWA	Elverta	101	65	65	Connecting to distribution systems	Relocation near diversion		
	SSWD	Elverta	23	15[2]	15[2]				
	Roseville	Elverta	16	10	10				
	Sacramento	Elverta	225	145	145				
	NMWC	Elverta	210	136	-	-	As needed for ensuring operation	-	-
	Subtotal for Elverta		**575**	**371**	**235**				
ARPS-Elverta Diversion Alternative	PCWA	ARPS	101	65	65	Connecting to distribution systems	-		
	SSWD	Folsom Dam	23	-[3]	-[3]				
	Roseville	------ *Use existing groundwater capacity* -----							
	Sacramento	Elverta	225	145	145		Relocation near diversion		
	NMWC	-	-	-	-	-	-	210	136
	Subtotal for Elverta		**225**	**145**	**145**				
ARPS-Joint Sacramento-ABFSHIP Elverta Diversion Alternative	PCWA	ARPS	101	65	65	Connecting to distribution systems	-		
	SSWD	Folsom Dam	23	-[3]	-[3]				
	Roseville	----- *Use existing groundwater capacity* -----							
	Sacramento	Elverta	225	145	145		Relocation near diversion		
	NMWC	Elverta	210	136	-		As needed for ensuring operation	-	-
	Subtotal for Elverta		**435**	**281**	**155**				

[1] All SRWRS facility plans would provide the following water rights and contract entitlements:

- PCWA's 35,000 AF per year CVP contract entitlement
- SSWD's 29,000 AF per year PCWA's MFP contract entitlement in Water Forum non-wet years
- Roseville's diversions of up to 7,100 AF per year PCWA's MFP contract entitlement
- Sacramento's diversions from 245,000 AF per year American River water rights and 81,800 AF per year Sacramento River water rights beyond the capacity of the Sacramento River and Fairbairn WTPs, while observing WFA limitations on diversion at the Fairbairn WTP.

[2] SSWD also would use additional shoulder capacity for delivery of up to 29,000 AF per year.

[3] SSWD also would use existing shoulder capacity at SJWD's Peterson WTP for delivery of up to 29,000 AF per year.